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THE PHORESY OF ANTHEROPHAGUS.¹

BY WILLIAM MORTON WHEELER.

August 16, 1919, while collecting Hymenoptera near Colebrook, in northwestern Connecticut, I observed a worker humble-bee (*Bombus vagans*) behaving in an erratic manner on the flowers of a golden-rod. The insect was standing with straightened legs on the tips of its tarsi and repeatedly attempting to insert its proboscis into the flowers, but did not succeed because a small red beetle was firmly attached by its mandibles to the tip of the right maxilla and the tongue. The beetle, which proved to be a female of the Cryptophagid *Antherophagus ochraceus* Mels., did not release its hold in the cyanide jar, so that I am able to show it in its original position in the accompanying figure (Fig. 1). I failed to find any record of such behavior in our American *Antherophagi* (*ochraceus*, *convexus* and *suturalis*), but a perusal of the accounts of the closely allied European species (*nigricornis*, *silaceus* and *pallens*) yields a satisfactory explanation of the peculiar activities described above.

In 1896 Lesne called attention to a number of small insects that habitually ride on larger insects. To this phenomenon he applied the term "phoresy" and showed that it is distinguished from ectoparasitism by the fact that the portee does not feed on the porter and eventually dismounts and has no further relations with the latter. The following year (1897) Charles Janet studied the known cases of phoresy somewhat more comprehensively, expanded the concept and distinguished no less than six different categories:

(1) Cases like that of the small flies of the genus *Limosina* which ride on the dung-beetle, *Ateuchus*, and represent phoresy in its typical form as conceived by Lesne.

¹ Contributions from the Entomological Laboratory of the Bussey Institution, Harvard University, No. 162.

(2) Cases in which the portee is conveyed to the nest of the porter, like the triungulin larvæ of certain beetles (*Sitaris*, *Meloe*, etc.) and the triungulinids of the Strepsiptera.

(3) Cases like a few myrmecophilous beetles (*Thorictus*) which attach themselves to the antennæ of ants for the purpose of accompanying them on their peregrinations.

(4) Cases like the mites of the genus *Antennophorus* which are not only carried but fed by the ants. These and the cases under (3) might be referred to ectoparasitism.

(5) Indirect phoresy, as exhibited by certain mites that cling to the surfaces of ant larvæ and pupæ which are in turn transported by the ants.

(6) The cases of ants that carry in their mandibles their own young, other members of the colony or guests.

In 1911 Banks published a valuable list of some 17 cases of phoresy collected from the literature, and several others have been recorded by Warner (1903), Brues (1917a, 1917b) and Rabaud (1917). Among the cases cited by these authors are those of certain small parasitic Hymenoptera which attach themselves to the abdomens of Orthoptera or to the wings of Mantoidea in order to be on hand to oviposit in the eggs of their porters. Such cases really represent a seventh category of phoresy.

Among the cases cited by Lesne and Janet and apparently overlooked by Banks, is *Antherophagus*, which attaches itself to the legs, mouthparts or antennæ of humble-bees for the purpose of being transported to their nests. The earliest observation of this habit seems to have been made by the British Coleopterist T. J. Bold. This author's two references to *Antherophagus* (1856 and 1871) were kindly sent me from London by my friend, Mr. Horace Donisthorpe, after I had vainly endeavored to find them in the Boston libraries. The first reference runs as follows: "Mr. Smith, in his admirable work on British bees, records the finding of *Antherophagus glaber* in the nest of *Bombus deshameilus*. This season I met with an instance of the manner in which such insects may be transported thither. When hunting *Bombi* in September last, the peculiar motions of a neuter of *B. sylvarum* attracted my attention: it was clinging to a thistlehead, and wriggling and twisting its legs about in all directions. On getting hold of it I found that a large specimen of *Antherophagus nigricornis* had

seized the tarsus of a hind leg between its jaws, and was holding on like grim Death. I put both into my bottle, and the *Antherophagus* retained its hold until both were killed by the fumes of the laurel." The reference of 1871 is to this same find and occurs

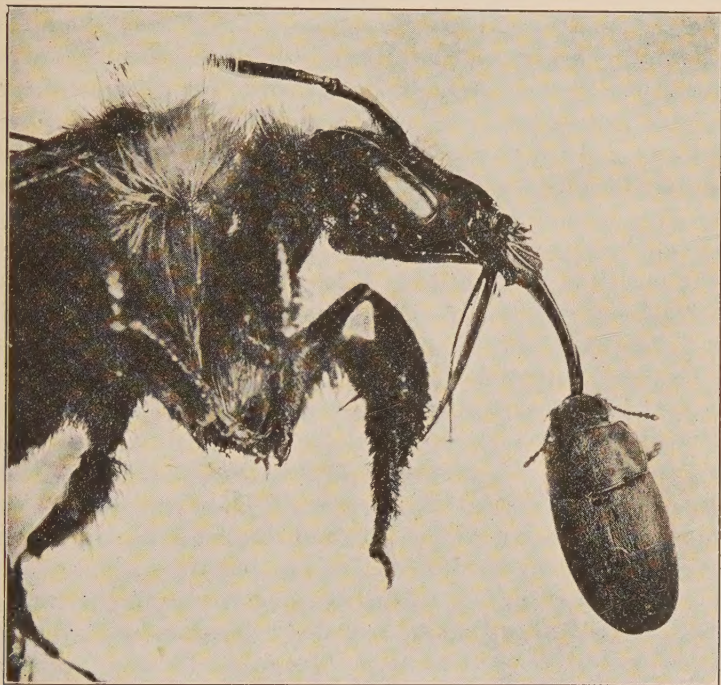


Fig. 1. *Antherophagus ochraceus* Mels. attached to proboscis of *Bombus vagans* Sm.

on page 60 of Bold's "Catalogue of the Insects of Northumberland and Durham."

Redtenbacher (1858) records having taken three adult *A. nigricornis* in a humble-bee's nest, together with a number of larvæ, which very probably belonged to the beetle. In 1863 Carus and Gerstaecker published the following note on the genus *Antherophagus*: "The species live on flowers, attach themselves to humble-bees and permit the latter to transport them to their nests, probably for the purpose of oviposition; at any rate, small

larvæ resembling those of *Cryptophagus* are sometimes found among the beetles in the nests of humble-bees." Eichhoff (1866) after examining several *Bombus* nests states that *A. nigricornis* was nearly always present and that single specimens of *silaceus* and *pallens* occurred in the same situations. Gorham (1869) captured *A. pallens* together with certain species of *Cryptophagus* in a nest of *Bombus pratorum*. Perris (1869-'70), while collecting in the Pyrenees, took an *A. nigricornis* attached to the antenna of a *B. montanus*, and though he did not know of the observations of Bold and Carus and Gerstaecker he nevertheless drew the same inference from his observations as the two German authors. Bugnion (1869-'70) in a letter to Perris recorded the following observation: "While collecting at Angeiades (alt. 1900 m.) in the Alps of Vaud, in the month of August 1866, I took a *Bombus* which had an *Antherophagus pallens* Oliv. attached to its proboscis by the mandibles." Seidlitz (1869-'70), commenting on Perris' observations, records the occurrence in a museum collection of three *Bombi* each with an *Antherophagus* attached to an appendage. In 1875 Perris published a detailed description of the larva of *A. silaceus* taken from the nest of *B. sylvarum*. Hoffer (1883), Fowler (1889), Sharp (1899), Wagner (1907), Reitter (1911), Sladen (1912) and Reuter (1913) all give brief notices and Wagner publishes a figure of *A. nigricornis* attached to the bee's proboscis.

The accounts of the North American *A. ochraceus* though meager go back to 1864 when Packard recorded its capture by F. W. Putnam in several *Bombus* nests in Massachusetts and Vermont. Packard figured the beetle in this paper and the beetle and larva in two of his well-known books (1872, 1873). J. B. Smith (1909) and Blatchley (1910) mention the occurrence of *A. ochraceus* on various flowers and the former notes its occurrence in *Bombus* nests. Casey (1900) in his taxonomic revision of the Cryptophagidæ says nothing about the habits of the beetle, though he makes the following significant remarks on the genus (p. 87): "This is one of most isolated genera of the family and contains by far the largest species, *Haplolophus* being the only other which approaches it in this respect. The emargination of the clypeus, very deep in the male but feeble in the female is apparently a unique character in the family," etc.

The observations recorded at the beginning of this paper to-

gether with Packard's show that our species are very similar in habits to their European cousins. Though possessed of well-developed wings and able to fly about and take up their position on flowers, *Antherophagus* does not seek out the *Bombus* nests but compels the bee to carry it to the place in which its eggs and larvæ are to develop. As Sharp says, "we must presume that its senses and instincts permit it to recognize the bee, but do not suffice to enable it to find the bee's nest." The structure of the mandibles and the peculiar notch in the clypeus are clearly adaptations to firmly grasping the more or less cylindrical joints of the bee's appendages, and the red color of the integument and investment of golden yellow hairs, so very suggestive of conditions in many myrmecophilous beetles, may account for the fact that the *Antherophagi* live unmolested in the *Bombus* nests.

The feeding habits of the adult and larval *Antherophagus* seem not to have been actually observed by any of the authors mentioned in the preceding paragraphs. Packard (1864) believed it "probable from the fondness, which these insects manifest for the sweets of flowers, that they visit the nests of the bees for the purpose of consuming the honey stored up within them." In 1873, however, he inferred that the beetle "probably feeds upon the wax and pollen," a statement which seems to have been suggested by the generic name given by Latreille. The views of the various authors concerning the feeding habits of the larva are, with one exception, practically unanimous. Perris (1875) says: "The larvæ of *Antherophagus* probably play the same rôle in the humble-bee nests as do *Cryptophagus pubescens* and *scanicus* in the nests of wasps. I do not believe that they devour the honey stored up by the bees or that they attack the bee larvæ, not one of which showed the slightest lesion; I am convinced that they live on the feces of the inhabitants and that they are, properly speaking, merely scavengers." In the same paper he calls attention to the larva of *Cryptophagus dentatus* Herbst which lives under chestnut bark in company with the larva of *Dryocætus villosus* and feed on its excrement. Lesne (1896) states that the *Antherophagus* larvæ "live as mutualists rather than as commensals in the *Bombus* nests." In contrast with this rather vague and colorless statement, Wagner (1907) paints a lurid picture of the activities of the beetle and its larvæ. After describing the transportation of the beetle on the

bee's proboscis, he continues: "The humble-bee evidently feels decidedly uncomfortable if she does not actually suffer pain. She crawls over the combs of the nest, extrudes her proboscis and makes a series of movements for the purpose of getting rid of her burden, but in vain. Other bees come up, 'affectionately' palpate her with their antennæ and pass on without the slightest attempt to help their 'comrade,' without the feeblest movement towards assisting her to ward off the dangerous enemy. And dangerous the beetle certainly is for from the eggs it lays hatch larvæ which, by destroying both the wax and the cocoons, will cause enormous devastation in the nest." It is difficult to estimate how much of this is observation and how much is imagination. Subsequent writers return to the opinion of Perris and regard the *Antherophagus* larvæ as harmless scavengers. Thus Reitter (1911) asserts that they "probably live on the excrement of the inhabitants of the nest" and Reuter (1913) that they "live on all sorts of refuse." Sladen (1912), who has a very intimate knowledge of the humble-bees and their nest-mates, classifies the *Antherophagi* "among the smaller and less important inhabitants of humble-bees' nests." We may conclude, therefore, that the larvæ of these beetles are in all probability merely scavengers in the *Bombus* nests and hence closely resemble the larvæ of *Cryptophagus* in habits as well as structure.

LITERATURE.

1911. Banks, N. Cases of Phoresie. Ent. News 22, 1911, pp. 194-197.
1910. Blatchley, W. S. An Illustrated Descriptive Catalogue of the Coleoptera or Beetles (Exclusive of the Rhyncho-phora) known to occur in Indiana. Nature Publ. Co., Indianapolis, 1910.
1856. Bold, T. J. Note on *Antherophagus nigricornis* and *Bombus sylvarum*. Zoölogist 14, 1856, p. 5003.
1871. Bold, T. J. A Catalogue of the Insects of Northumberland and Durham [Revision of Coleoptera]. Nat. Hist. Trans. Northumberland and Durham 4, 1871, p. 60.
- 1917a. Brues, C. T. Adult Hymenopterous Parasites Attached to the Body of Their Host. Proc. Nat. Acad. Sc. 3, 1917, pp. 136-140, 1 fig.

- 1917b. *Brues, C. T.* Note on the Adult Habits of Some Hymenopterous Egg-parasites of Orthoptera and Mantodea. *Psyche* 24, 1917, pp. 195-196, 1 fig.
- 1869-70. *Bugnion, E.* (Letter to Perris on *Antherophagus*) *L'Abeille* 7, 1869-70, pp. XXVI-XXVII.
1863. *Carus, J. V. and Gerstaecker, A.* Handbuch der Zoologie, Vol. 2. Leipzig, W. Engelmann. 1863.
1900. *Casey, T. L.* Review of the American Corylophidæ, Cryptophagidæ, Tritomidæ and Dermestidæ, with other Studies. *Journ. N. Y. Ent. Soc.* 8, 1900, pp. 51-172, 4 figs.
1866. *Eichhoff.* Sammelberichte, Berlin, *Ent. Zeitschr.* 1866, p. 293-295.
1889. *Fowler, Canon.* The Coleoptera of the British Islands. London, Reeve & Co., 1889.
1869. *Gorham, H. S.* Leptinus in bees' nests. *Ent. Month. Mag.* 6, 1869, p. 89.
1911. *Grouvelle, A.* Coléoptères Cryptophagides recueillis au Mexique par M. L. Digueu dans les nids du *Bombus ephippiatus* Say. *Bull. Mus. Hist. Nat. Paris*, 1911, pp. 97-100.
1883. *Hoffer, Ed.* Die Hummeln Steiermarks, 1, Hälfte, 1863, p. 46.
1897. *Janet, C.* Etudes sur les Fourmis, les Guêpes et les Abeilles. Note 14, *Rapports des Animaux Myrmécophiles avec les Fourmis.* Limoges, V. H. Ducourtieux, 1897.
1896. *Lesne, P.* Mœurs du *Limosina sacra*. Phenomènes de transport mutuel chez les animaux articules, Origine du parasitisme chez les insectes Diptères. *Bull. Soc. Ent. France* 45, 1896, pp. 162-165.
1864. *Packard, A. S.* The Humble-Bees of New England and Their Parasites, with notes of a new species of *Antherophorabia*, and a new genus of Proctotrupidæ. *Proc. Essex Inst.*, 4, 1864, pp. 107-140, Pl. 3.
1872. *Packard, A. S.* Guide to the Study of Insects, 3rd Ed. Salem, Naturalists' Agency, 1872.
1873. *Packard, A. S.* Our Common Insects. Salem, Naturalists' Agency, 1873.

- 1869-70. *Perris, Edm.* (Note on *Antherophagus nigricornis*)
L'Abeille 7, 1869-70, pp. IX-X, XXV-XXVII.
1875. *Perris, Edm.* Larves des Coléoptères. Ann. Soc. Linn.
Lyon, 22, 1875, pp. 259-418.
1917. *Rabaud, Et.* Sur les Hyménoptères parasites des oothèques d'Orthoptères. Bull. Soc. Ent. France, 1917, p. 178.
1858. *Redtenbacher, L.* Fauna Austriaca. Die Käfer. Wien, Carl Gerold's Sohn, 1858, p. 360 *nota*.
1911. *Reitter, Edm.* Fauna Germanica. Die Käfer des deutschen Reichs. Stuttgart, K. G. Lutz. 1911.
1913. *Reuter, O. M.* Lebensgewohnheiten und Instinkte der Insekten bis zum Erwachen der sozialen Instinkte. Berlin, Friedländer and Sohn. 1913.
- 1869-70. *Seidlitz, G.* (Note on *Antherophagus nigricornis*)
L'Abeille 7, 1869-70, p. LXII-LXIII.
1912. *Sladen, F. W. L.* The Humble-Bee. Macmillan & Co. 1912.
1909. *Smith, J. B.* Insects of New Jersey. 1909.
1899. *Sharp, D.* Insects, in Cambridge Natural History 6, 1899.
1907. *Wagner, W.* Psychobiologische Untersuchungen an Hummeln mit Bezugnahme auf die Frage der Geselligkeit im Tierreiche. Zoologica 19, 1907, p. 145 (Fig. 117).
1903. *Warner, W. V.* (Note on *Dichromorpha viridis*). Proc. Ent. Soc. Washington 5, 1903, pp. 308, 309.
1877. *Xambeau, P.* (Note on *Podagrion pachymerus*). Bull. Soc. Ent. France 1877, p. LXIX.

A NEW SPECIES CLOSELY RESEMBLING *DROSOPHILA MELANOGASTER*.

By A. H. STURTEVANT,
Columbia University, New York City.

In the course of genetic experiments with *Drosophila melanogaster* Meigen a wild race was found that gave unexpected results. Examination showed that it was structurally different from typical *D. melanogaster*. The new form has been found to be common and widely distributed. Since it is evidently a distinct species that has hitherto been overlooked, and since it will certainly be extensively discussed in genetic literature in the future, the following name and description are presented.

Drosophila simulans, sp. nov.

Closely similar to *D. melanogaster* Meigen in size, color, shape, venation, chaetotaxy, and in the presence of tarsal combs in the male. The eyes are a little larger and the cheeks a little narrower than in that species; but these differences are not sufficiently well-marked to serve as diagnostic characters. The external male genitalia, shown in figure 2, are clearly distinct from those of *D. melanogaster* (figure 1): The most reliable differences here are in the size and shape of the posterior process (p) of the large anterior plate, and in the shape and vestiture of the smaller comb-bearing plate (c). In relaxed pinned material the two species may be separated by means of the posterior process. In *D. melanogaster* it appears as a small hook; in *D. simulans* it resembles a clamshell, since the basal part is not usually observable.

Living material shows several other slight differences, not definite enough to serve for purposes of classification, but observable in large series as average differences. *D. simulans* has a slightly darker mesonotum, often with a bubble beneath the surface in the mid-dorsal line. The abdomen is a little stouter, the wings a little shorter. The dark abdominal bands of the female are not quite as deep black as those of *D. melanogaster*. The egg has two filaments at its anterior end, that are somewhat longer, and less dilated at their tips, than those of *D. melanogaster*.

Type, allotype, and gonotypes: bred, in New York City, from

stock collected at Lakeland, Fla. (C. W. Metz). Type deposited at the American Museum of Natural History, New York City. The gonotypes are not descended from the type, but the whole type series is known to be descended from a single female.

Other specimens examined: Randolph, N. H. (Miss H. Daniels); Cold Spring Harbor (C. W. Metz), Staten Island (F. Schrader), N. Y.; Rochester, Minn. (L. Huckfield); Richmond, Va.; Macon, Ga. (G. L. Carver); Palm Beach, Fla. (B. B. Horton); Kushla, Ala.; Fayetteville, Ark. (B. Schwartz); Port Limon, Costa Rica.

Examination of genitalia shows that *D. melanogaster* has at least the following range: Nova Scotia to Oregon, California, and Florida; Cuba, Porto Rico, Costa Rica, Panama; Holland; Australia.

D. simulans and *D. melanogaster* may be crossed, though only with difficulty. The hybrids so far obtained have apparently all been sterile. They are obtained most easily from the mating of *D. melanogaster* female by *D. simulans* male; and from this cross only females are ordinarily produced. It was the discovery of this fact

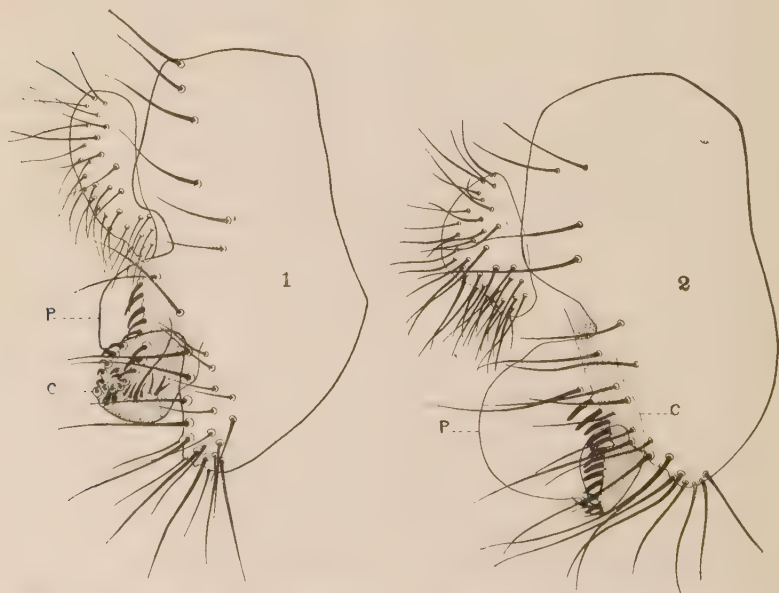


Fig. 1. 1, External male genitalia of *Drosophila melanogaster* Meig., from cleared material collected in Minnesota; 2, external male genitalia of *Drosophila simulans* sp. nov., from cleared material mounted in balsam. Gonotype.

by Mr. A. M. Brown that led to the identification of *D. simulans* as a distinct species. Males have, however, been obtained by using *D. melanogaster* females that give what are known to students of heredity as "non-disjunctional exceptions." A full account of these experiments and a description of the hybrids will be published later.¹

DESCRIPTIONS OF NEW TRYPHONINÆ OF THE TRIBE CTENOPELMINI (HYMENOPTERA; ICHNEUMONIDÆ).²

BY MISS ESTHER W. HALL,
Bussey Institution, Harvard University.

Polyblastus fulvilinealis sp. nov.

♂. Length 6 mm. Head wider than thorax, thickened behind eyes. Malar line equal to one-half the base of clypeus. Distance from ocellus to clypeus slightly longer than from eye to eye. Front protruding below antennæ, which are almost as long as body and composed of 28 segments. First flagellar joint slightly longer than scape and pedicel, four times as long as wide at apex. Fourteenth segment about twice as long as wide and one-half the length of first flagellar joint. Scutellum flat, margined. Pronotum prominent. Parapsidals present anteriorly. Areolation complete. Abdomen subsessile. Length of petiole two and one-half times width of base; width at apex twice that of base. Third segment twice as broad as long and one-fifth narrower than thorax. Carinæ with groove between and extending almost to apex. Base of hind coxæ to apex of femora longer than abdomen. Five teeth on claws. Wings large, areolet small, petiolate, rhomboidal. Head, except cheeks, finely punctate; thorax, except slightly rugulose propodeum, sparsely punctate; abdomen smooth.

Black. Rufous as follows: apical half of clypeus, collar, and lower pleuræ, propodeum, hind coxæ and femora, outside of four anterior femora. Antennæ and hind tarsi dusky. Mandibles except teeth, underside of pedicel, remainder of fore legs, hind

¹ It seems highly probable that the sterile "unisexual broods" of *Drosophila* reported by Quackenbush (1910. Science, n. s. 32; 183-185) were hybrids between *D. melanogaster* and *D. simulans*.

² Contributions from the Entomological Laboratory of the Bussey Institution, Harvard University, No. 167.

tibiæ except dusky apices, tegulæ, vein bases, lines between pro- and meso- and between meso- and metapleuræ, narrow lines on apex of second and third abdominal segments, whitish.

♀. Length 7 mm. Areola open anteriorly; face more coarsely punctate. Ovipositor bearing eggs. Thorax, except pronotum, and base of petiole rufous. Fore legs darker, otherwise like the male.

Male from Auburndale, Mass., and female from Riverside, Mass.

***Polyblastus scopioroides* sp. nov.**

♂. Length 7 mm. Slight, head not so swollen, as wide as thorax. Claws slender, with 4-5 small teeth. Distance from eye to eye almost equal to that from ocellus to clypeus. Malar line equals one-half the base of clypeus. Antenna with 31 segments, 5-16th swollen. Tenth segment one-third again as wide and two-thirds as long as first flagellar segment which is three and two-thirds times as long as wide at apex and the same length as scape and pedicel. Parapsidal furrows faint. Pleuræ swollen. Basal transverse carinæ wanting. Abdomen sessile, carinæ extending three-fourths the length of the petiole, which equals, in length, the apical width. Third segment twice as broad as long and not as wide as thorax. Legs slender. Areolet rhomboidal, petiolate. Face densely, punctate, thorax rather coarsely so, abdomen sparsely so, except petiole, which is coarsely so at base and rugulose near apex.

Black. Rufous as follows: apex of clypeus, segments 2, 3, 4, apex of petiole, legs except apex of posterior femora, tibiæ, and tarsi which are dusky. Mandibles except teeth, bases of veins, spot on stigma, and, indistinctly, the trochanters, white.

In general appearance like *Scopiorus subcrassus*, Cress. but without transverse abdominal furrows.

Male from Woods Hole, Mass.

***Polyblastus kaniacensis* sp. nov.**

♀. Length 8 mm. Head not so thick as in other species. Face protuberant. Distance from ocellus to clypeus one and one-third times the distance from eye to eye. Malar line one-half the basal width of mandible. Clypeus narrow with transverse ridge near base. Antennæ with 34-35 segments. First flagellar seg-

ment one-fifth longer than scape and pedicel. Apical 6 segments each as long as broad except the last segment which is one and one-half times the length of previous one. Scutellum flat, margined, sloping suddenly behind. No parapsidal furrows. Pleuræ rather flat. Basal carina wanting on propodeum. Abdomen sessile, carinæ extending to middle of petiole, apex of petiole one and one-half times the width at base and two-thirds the length. Third segment not quite as wide as thorax. Ovipositor short. Legs rather stout, claws pectinate. Face and propodeum coarsely punctate, rest of thorax sparsely so; abdomen finely punctate. Areolet rhomboidal, petiolate. Humeral cross-vein of hind wing broken at middle.

Black. Rufous as follows: apical part of clypeus, apex of petiole and remainder of abdomen, apex of trochanters, femora except black apices of hind ones and yellow tips of others. Coxæ and bases of trochanters black, rest of fore legs yellow-ferrugineous with last tarsal segment dusky; remainder of hind legs dusky. Bases of hind tibiæ yellow. Tegulæ, bases of wing veins, palpi and mandibles except teeth, yellowish-white. Tibiæ with a faint rufous annulus.

Female from Kaniac Butte, Washington, collected by Prof. A. L. Melander, I–IV, 1912.

***Grypocentrus rufiterminalis* sp. nov.**

♀. Length 9–10 mm. Head large. Distance from eye to eye almost two-thirds the distance between ocellus and clypeus. Malar space one-third the width of clypeus. Face slightly convex. Clypeus wide, almost from eye to eye, with transverse ridge and short bristles at apex. Antennæ with 36 segments, extending to middle of abdomen; segments 9–25 thickened. Scape two-thirds the length of first flagellar segment, which is three times as long as width at apex. Middle segments and those beyond slightly longer than wide. Parapsidals present anteriorly. Scutellum rounded, sloping gradually behind. Pleuræ convex. Areola open anteriorly, propodeum otherwise completely areolated. Apex of petiole one-third wider than base, its length two and one-third times the basal width. Carinæ close together and extending almost to apex. Length of segment about the same as width at base. Legs robust; claws finely pectinate. Body covered with silver pile. Face very

coarsely punctate except apex of clypeus which is sparsely so; thorax coarsely so; abdomen almost smooth. Ovipositor short and curved. Humeral cross nervure of hind wing broken at middle. Areolet rhomboidal, slightly petiolate.

Black. Rufous as follows: abdomen except base of petiole, apex of clypeus, mandibles, palpi, and tegulæ; apex of antennæ and underside of base and pedicel; legs, except tips of hind femora, tarsal segments and outside of hind tibiæ, which are dusky. Wing veins dusky except fulvous bases and spot on stigma.

Four females, collected by C. T. Brues at Petersham, Mass. VII, 1918.

Prinopoda media sp. nov.

♀ . Length 8 mm. Head large, thickened behind the eyes, front rather flat. Malar line one-third the basal width of mandibles. Distance from ocellus to clypeus one-fourth longer than from eye to eye. Front gradually and slightly convex. Clypeus with transverse ridge near base, emarginate at apex, and indistinctly bilobed. Antennæ with 39 segments. First flagellar joint longer than scape and pedicel; segments 5-25 thickened; twelfth segment three-fourths as broad as long and one-third wider than first segment. Parapsidal furrows faint. Scutellum rather flat, margined anteriorly. Pleuræ flat. Areola open anteriorly. Abdomen petiolate, first segment slightly wider at apex than at base; third twice as wide as apex of first and almost as wide as thorax. Parallel carinæ extending to apex of first segment. Ovipositor 2 mm., curved. Legs long, slender; claws with 4-6 long teeth. Areolet irregular, petiolate. Front finely punctured. Pronotum smooth. Lower meso- and metapleuræ coarsely punctate. Propodeum rugulose. Abdomen smooth, except petiole, which is faintly rugulose.

Black. Yellow as follows: mandibles except teeth, clypeus, tegulæ, all trochanters, anterior coxæ, tips of anterior femora, tibiæ, and tarsi except apices which are ferrugineous. Second and third abdominal segments, antennæ beneath, anterior femora, hind coxæ and hind tibiæ except apices, ferrugineous. Palpi, annulus on posterior tibiæ, spurs and bases of tarsal segments, white. Rest of hind tibiæ and tarsi black.

Female from Machias, Maine, VII, 1917.

Scopiorus plagosus sp. nov.

♀ . Length 4 mm. Head as wide as thorax, slightly protuberant beneath antennæ. Distance from eye to eye about equal to distance from clypeus to ocellus. Malar line two-thirds the basal width of mandible. Clypeus rather flat, but separated from face by groove. Antennæ extending to middle of abdomen, with 24 segments; 4-12 thickened; length of first flagellar joint four times its apical width and more than that of scape and pedicel; next joint three times as long as wide and 11th segment twice as long as wide. Parapsidal furrows indicated anteriorly. Basal transverse carinæ wanted on propodeum. Scutellum flat, triangular, and margined. Abdomen sessile, petiole one-fourth wider at apex than at base; third segment slightly wider than thorax. Carinæ of petiole extending to rugulose transverse groove near apex. Transverse groove on second segment clearer laterally. Claws thickly pectinate. Ovipositor curved. Areolet wanting. Humeral cross nervure of hind wings broken below middle. Face finely punctured; cheeks sparsely so; thorax coarsely so, except pronotum; first two segments of abdomen rugulose.

Black. Yellow-rufous as follows: base and apex of second and third segments, legs with the following exceptions which are black; claws, posterior coxæ, bases of other coxæ, hind femora (except apex) and outside of four front femora. Scape, mandibles except teeth, clypeus, face except clypeal suture and band from antennæ to clypeus, narrow line on apex of segments, 3, 4, and 5, yellow; tegulæ and bases of veins, white.

Female from Yellowstone Park, Continental Divide, 8200 ft., collected by Prof. A. L. Melander, August 8, 1919.

This is nearest to *Scopiorus expansus* Davis.

A NOTE ON THE HABITS OF *EPACTIOTHYNNUS*
OPACIVENTRIS TURNER, AN AUSTRALIAN THYNNID WASP.

BY FRANCIS X. WILLIAMS,

Hawaiian Sugar Planter's Experiment Station, Honolulu.

During the winter of 1919, while engaged in entomological work on the Herbert River, North Queensland, for the Experiment Station of the Hawaiian Sugar Planter's Association, I made a few observations on this wasp. *Epactiothynnus opaciventris* is a moderately small species of the great Australian group of Thynnidae. The male measures about 11 and the female 8 mm. in length. At the time of observation it was the most abundant of the few species of Thynnids then flying and its main food flower was *Crotalaria* sp., a common weed along roadsides and edges of fields.

I can find nothing in literature which relates to the egg and larval stages of any of the Australian Thynnidae, though Froggatt (Australian Insects, 1907) has dug up cocoons which yielded a large species. He states that these wasps probably parasitize the larvæ of Lamellicorn beetles.

When females of *Epactiothynnus* were enclosed in a tumbler or shallow dish of soil with Lamellicorn grubs about 14 mm. long, and which were common in some of the cane fields, these grubs

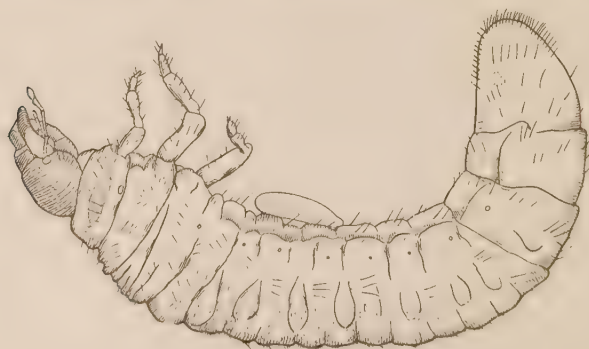


Fig. 1. Larva of one of the Scarabæid beetles, showing egg of *Epactiothynnus opaciventris* on its mid-ventral line. (X 4.25, North Queensland.)

were eventually stung to almost complete paralysis, just as the *Scolias* sting their prey. I did not observe the act of stinging, but a single *Epactiothynnus* would sometimes paralyze several grubs overnight. Something was wrong, however, perhaps the weather was too cool, for of the many grubs stung but one had an egg upon it, and that failed to hatch. The egg (Fig. 1) is deposited along the mid-ventral line of the larva. It is pearly white, somewhat arcuate, thicker at one extremity, and measures 1.85 x 0.40 mm.

Tachynomyia sp., a darker and somewhat larger Thynnid was found also to paralyze the same species of beetle larva that was offered to *Epactiothynnus*.

In the bulk of the Thynnidæ the strong-winged male, as he flies from place to place or feeds at flowers, carries his apterous and obese partner with him. In captivity, at least, two *Epactiothynnus* may remain paired for several days.

Fig. 2 is a drawing from life of a small species of Thynnid taken near Sydney. She was first observed crawling on the ground, then ascend a reed, place herself in an inverted position, with the abdomen inclined a little forward, and thus motionless to await the coming of the male. *Epactiothynnus* females had the same habit awaiting their mates in a conspicuous place. The circling males sometimes betrayed her whereabouts; as soon as located she was immediately seized and carried off.

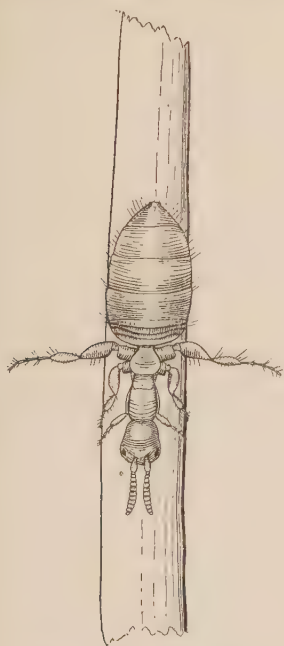


Fig. 2. Female Thynnid on reed; in such a position, she awaits the advent of the winged male, which carries her off. (X 6.7, Sydney.)

Australia has perhaps the richest fauna of Scarabeid beetles in the world, so it is not surprising that the enemies of these often destructive insects are similarly numerous. The immense Thynnid population of several hundred species far outnumbers the *Scoliidae*, and it may be affirmed

with some degree of certitude that, like the latter, they prey essentially on Lamellicorn beetle grubs. The rather anomalous "blue ant," *Diamma bicolor*, is somewhat related to the *Methoca* group, and being a fierce and active insect of good size perhaps attacks caraboid beetle larvæ.

AN AFRICAN FIGITIDÆ.

BY ALFRED C. KINSEY,

Bussey Institution, Harvard University.

Aspicera africana sp. nov.

Male and Female. Body entirely black, except the antennæ and legs, which are rufous-brown. *Head:* black, ocelli yellowish, compound eyes silvery; front concave, coriaceous, with a few, short, wavy lines, bounded laterally by prominent ridges extending from the lateral ocelli to the base of the antennæ and beyond half way to the mouth; lower half of face irregularly rugosostriate, hairy; cheeks hairy; mandibles dark rufous; antennæ rufous-brown, darker toward the tips, in the ♀ 13-jointed, in the ♂ 14-jointed. *Thorax:* entirely black, finely coriaceous, the sides of the pronotum and the metapleuræ dense with white hairs; mesopleuræ with a large shining area; parapsidal grooves continuous, deep, cross-ridged, broad at the scutellum, curved sharply apart at the pronotum; a narrow, elevated median ridge extending from the pronotum half way to the scutellum; the depressed median groove from that point to the scutellum is two-thirds as wide as the distance between parapsidals; anterior parallel lines smooth, elevated, extending half the length of the thorax; foveæ very large, very deep, sparsely striate, with a fine, shallow ridge between; the spine of the scutellum about half the length of the whole scutellum, with 3 to 5 longitudinal ridges. *Abdomen:* piceous black, finely and regularly punctate, the 2nd segment dorsally about one-third the total length and reduced to a mere scale on the sides, 3rd segment reaching almost to the tip of the abdomen; abdomen in the male similar but more slender. *Legs:* uniformly rufous-brown, including the coxæ; with short hairs. *Wings:* very clear, without hairs; the subcosta, basal vein, and radius distinct, pale

yellowish, the other veins hardly discernible; apical branch of the subcosta lacking; radial area open also at the distal end. *Length*: 3.0–3.5 mm.

Range. South Africa: Salisbury, 5050 ft. (F. L. Snow coll.).

Types. 1 female and 1 male cotype in the collection of the Kansas State Museum; and 1 male cotype in the author's collection.

One of the male specimens is marked as collected in June, 1900; the other male and the female in Dec. 1900. In *Das Tierreich*, in Dalla Torre and Kieffer's key the species would run down to *A. coriacea* from which it is distinct in having all parts of the thorax black and the legs uniformly rufous-brown. The genus has not heretofore been known from Africa south of the north coast.

ON THE VARIATION OF *TABANUS ATRATUS* FABRICIUS.

BY CHARLES W. JOHNSON,
Boston Society of Natural History.

This species, in its distribution along the Atlantic coast from Maine to Florida, is subject to considerable variation, which fact was referred to by Osten Sacken in his Prodrôme (Memoirs Boston Soc. Nat. Hist., vol. II). On page 455 he says: "Northern specimens, for instance those found around Boston, often have the wings pale brown, even yellowish brown toward the posterior margin." Professor Hine in describing this form as *T. nantuckensis* from Nantucket, seems to have overlooked this reference, for he says: "There is reason to believe that this insect has become isolated on the Island for it has not been taken elsewhere so far as I can find."

Tabanus atratus var. *nantuckensis* Hine

Tabanus nantuckensis Hine, Ohio Jour. Sci., p. 271, 1917.

At most this is only a variety of *T. atratus*, apparently confined to the New England coast. Its "smaller size" does not count, for I have typical *T. atratus* as small as *nantuckensis* (20 mm.). This leaves for consideration only the color of the wings—dark brown with the posterior half or more, yellowish brown, as a distinguishing character, which in a large series from along the coast merges into

typical *atratus*. The series before me referable to *nantuckensis* show the following distribution:

N. H. Rochester, Sept. 8 (A. M. Wilcox).

MASS. Boston, July 10 (H. M. Parshley); Cohasset, July 24 (Owen Bryant); New Bedford and Horse Neck Beach, Aug. 9 (Dr. G. deN. Hough); N. Tisbury, July 21 (Dr. J. A. Cushman); Tuckerneck, July 21 (Dr. G. M. Allen); Muskeget, July 7 (W. S. Brooks); Hyannisport, July 4, Woods Hole, July 25, and Wellfleet, Aug. 16 (C. W. Johnson).

R. I. Block Island, Aug. 28, 1891 (A. P. Morse).

In this same region, typical *atratus* has been taken at the following places: Brookline, Auburndale, Sherborn, Framingham, Falmouth, Chatham and Woods Hole, Mass.

Tabanus atratus var. *fulvopilosus* var. nov.

This is another interesting variety which Osten Sacken refers to as follows: "The most remarkable variety, however, I received from Florida (Indian River, E. Palmer; Haulover Beach, March 12-14, Messrs. Hubbard and Schwarz); the thorax on each side bears a fringe of golden yellow hairs, not a trace of which is visible in ordinary specimens. I have four specimens from Florida, and two from some other southern locality not nearer defined, which show this peculiarity."

Fine examples of this variety were collected by Mr. S. E. Cassino at Orlando, Fla., in April, and by the writer on Anastasia Island, St. Augustine, Fla., April 21, 1919. I also collected a specimen at Avalon, N. J., July 19, 1891. Another specimen was captured at Cold Spring, near Cape May, N. J., June 24, 1903, by Mr. H. L. Viereck. The specimens from New Jersey have wings of a uniform dark brown approaching *nantuckensis*. A specimen of *nantuckensis* (from Nantucket) shows a slight trace of yellow pile above the base of the wings and lower edges of the post-alar callosities.

Another interesting variation of the more typical *atratus*, represented by two males and a female from Anastasia Island, Fla., April 12-19, has the black of the wings confined to broad margins along the veins, leaving subhyaline spaces between, giving the wings a striped appearance. A male of *nantuckensis* from Muskeget is similarly marked on the anterior half of the wings.

These varietal names may seem perhaps unnecessary, but when one has already been referred to as a species by one of our leading authorities in this family, it shows how striking the variations are when isolated. There is a peculiar significance in the fact that these variations are apparently confined to the immediate seaboard, and their abundance there would indicate that they probably breed in the adjacent salt or brackish marshes. The question arises do these diversified conditions affect the species and give rise to these variations. On the other hand there is a similar though less pronounced variation in *Tabanus trispilus*. From New Jersey southward is found the typical form with dark brown wings, but to the northward the wings are much lighter in color, representing the var. *sodalis* Will. Another Tabanid, *Chrysops fuliginosus* or *plangens*, which is strictly a coastal species, distributed from Maine to Florida, shows considerable variation in the color of its wings, even in the same sex. Florida specimens have a distinct subhyaline streak dividing the apical spot from the crossband. Specimens from New Jersey northward have the brown of the wings more diffused and the streak less clearly defined.

A NEW SPECIES OF THE GENUS *ULIDIA*.

BY CHARLES W. JOHNSON,
Boston Society of Natural History.

In a collection of Orthalidæ sent to me by Mr. E. P. Van Duzee for determination was the following apparently new species.

Ulidia similis sp. nov.

Head red, front punctate, each puncture bearing a short black hair, orbits pruinose, ocellar triangle black, one inner and one outer vertical and two post-vertical bristles, antennæ, palpi and proboscis reddish, arista blackish, thickened at the base. Thorax reddish, the disk black, covered with a grayish pollen and showing in a certain light two narrow dark vittæ, pleura red, between the front and middle coxæ blackish, two post-humerals, one pre-sutural, two supra-alar, one dorso-central, one notopleural, one mesopleural, and one sternopleural bristle, scutellum red, tips of the tarsi

brownish. Wings hyaline, costal cell brown, stigma black, tip of the marginal, submarginal and first posterior cell clouded with dark brown. Halteres white. Length 5 mm.

The female closely resembles the male. The first segment of the ovipositor is red, the tip blackish. Length 6 mm.

Fourteen specimens, Los Banos, Merced Co., California, May 22, 1918, collected by Mr. E. P. Van Duzee. Holotype (No. 521), allotype (No. 522) and eight paratypes in the collection of the California Academy of Sciences. Four paratypes in the author's collection.

Similar to *U. rubida* Loew, but that species has a broader and smoother front, the scutellum and pleura are a brighter red and more polished, the abdomen is also more polished and the ovipositor entirely black, the wings are a whitish hyaline, the apical spot smaller, the inner edge straight, not sinuous, and the tip of the first posterior cell narrower.

NEW MOSQUITOS FROM PANAMA.

By C. S. LUDLOW,

Army Medical Museum, Washington, D. C.

During the later months of the summer, in connection with the work at Army stations both in this country and abroad, some new forms belonging to different groups of mosquitos have been received at the Army Medical Museum, two of which are from Panama and the others from the A. E. F.-S. taken at four different stations in Siberia.

There have also been received from Siberia three species already described by Mr. Theobald, "*Culicida togoi*," "*Culicida nipponi*," and "*Culex osakaënsis*." These are Mr. Theobald's namings but some of these species have since been referred to other genera, by Mr. Edwards.

Some of the new species are described as follows:

Anopheles (*Stethomyia*?) *niveopalpis* sp. nov.

Female. Head: dark brown, practically black, covered with fine "tomentum," a frosty line around the eyes, a tuft of long slender white scales projecting forward between the eyes, white

lanceolate and forked scales on the vertex, and black forked scales on the occiput; these, changing somewhat in shape extend well toward the sides of the head; brown bristles extending forward around the eyes; antennæ brown, basal joint brown, second joint with a few slender white scales, verticels brown, pubescence white; proboscis very dark brown, labellæ light brown; palpi dark covered with very dark brown or black scales, outstanding on the proximal third, the apical parts of the ultimate and penultimate joints broadly snowy white, only a narrow brown band or spot intervening, which may possibly very narrowly involve both sides of the joint, a few yellowish hairs at the apex; clypeus brown, nude; eyes black.

Thorax: prothoracic lobes well separated, mamillated, with a few brown bristles; mesonotum grey and brown, the median portion of about one-third the width of the mesonotum is greyish, and this widens so as to include the "bare" space, a median dark brown line extending about half the length of the mesonotum and laterally the membrane is a soft brown. The small hairs are diffuse over the greyish portion, a line of larger hairs in the median dark line, and at the junction of this grey with the brown lateral portions, which latter is almost nude save for a few longer bristles on the lateral margin and over the wing joint. There are a few narrowly lanceolate white scales and a group of brown bristles at the nape; scutellum brown with scanty brown hairs and brown marginal bristles; postnotum brown, nude; pleura brown shading to the white of the coxæ.

Abdomen brown covered only with brown hairs, and brown border bristles.

Legs brown; coxæ very light, practically white, with a few brown bristles, femora light at the very base and on the ventral aspect, otherwise the scaling of all the legs is dark brown, with a minute yellowish knee-spot on the hind legs.

Wings clear, heavily clothed with dark brown rather broadly lanceolate scales, tending to give golden reflections; fringe dark except at the apices of both forks of the second long vein and the apex of the third where the color is a yellow such as is given by the reflections on other parts of the wings. First sub-marginal a little longer and narrower than the second posterior, its stem about half as long as the cell, and the stem of the second posterior nearly as

long as the cell; posterior cross-vein a little more than its length distant from mid-cross vein. Halteres with greyish stem and very dark knob.

Length about 3 mm. (body) proboscis 1.5 mm.

Taken July 28, Comacho Reservoir, Empire, Canal Zone, Panama.

Described from one specimen in good condition bred from larvæ taken at Comacho, and sent by Colonel H. S. Greenleaf, M. C., U. S. Army, Department Surgeon. A specimen which is probably the same was sent some time since, but was in such bad condition that, although it was believed to be a *Stethomyia* probably lying close to *nimba*, it was impossible to place. This I should also place as a *Stethomyia*, but hesitate to do so because the scales on the vertex are not true flat scales. However Theobald (Mono. Cul. Vol. IV, p. 59) divides *Stethomyia* into two groups and remarks "Group B has the cephalic scales not quite so flat as in A," and James and Liston in describing *Stethomyia culiciformis* speak of "a few white spindle-shaped scales in the middle line in front" (Mono. Ind. Anoph., p. 122, 1904), and it may be that the genus includes some in which these scales are not true flat scales. At all events it does not resemble *nimba* in the thoracic marking, and the palpal markings are very distinctive.

***Trichoprosopon (Joblotia) shropshirei* sp. nov.**

Female. Head light brown, covered with flat brown scales, lighter at the sides, and a row of dark brown forked scales at the nape; antennæ brown, verticels and pubescence brown, basal joint brown; proboscis long and slender, sometimes a little swollen near the apex, covered with dark brown scales having a bluish iridescence, a few dark bristles at the base, labellæ small, brown; palpi short, about one-tenth the length of the proboscis, dark brown; clypeus dark brown, with a row of minute dark brown hairs, on the anterior margin; eyes brown.

Thorax partly denuded, prothoracic lobes not contiguous, covered with large dark brown flat scales, somewhat elongated, and dark brown bristles, the latter mostly on the cephalic margin; mesonotum pale brown, and lighter laterad, sparsely covered with rather broad flat brown scales, except at the angles of the shoulders where the scales are a shiny yellowish white and merge into the very

broad flat shiny white scales of the pleura, which extend on the coxæ. There is a row of brown bristles on the lateral margin of the mesonotum and over the wing joint; scutellum almost yellow, with brown flat scales and a group of bristles on each lobe; metanotum light brown with a well marked bunch of dark bristles (7-15) on the median line on the caudad portion.

Abdomen covered with rich brown scales having a bluish-green reflection, and large yellowish white brilliant scales forming basal spots, and connecting with the light scales of the venter. The first segment has small lateral white spots, and the last segment has numerous dark bristles. The venter is light, but the narrow apical dark scales extending from the dorsum give it the appearance of being banded.

Legs: femora and tibiæ are light scaled on the ventral aspect almost to the apex, more markedly so on the hind legs, otherwise the legs are all a rich dark brown with rather bright yellowish reflections which is sometimes misleading as to a given joint or part of joint. Unguos simple.

Wings clear, slightly darkened and heavily clothed with large broad truncate dark brown scales, some of which are slightly asymmetrical, the lateral scales longer and not so broad. The first sub-marginal cell is somewhat longer and narrower than the second posterior, its stem about half the length of the cell, and the stem of the second posterior about three-fourths its length, the bases of the cell nearly on a line; the posterior cross-vein about its length interior to the mid-cross vein. The costal margin is "spinous."

Length—body about 3.5 mm., proboscis 2.5 mm., wing 2.5.

Taken July 23, at Camp Gaillard, Canal Zone, Panama.

Described from five females sent in the regular collections from the Panama Canal Department, and named for Mr. J. B. Shropshire, as a partial acknowledgment of his interest and care in collecting for the Museum.

The species is smaller than the others reported for this genus, and is very deceptive in appearance, for with these specimens was another, of practically the same general coloring which has curved scales on the head and thorax, no hairs on the clypeus, has rows of bristles on the mesonotum, and no hairs on the postnotum.

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